

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TEXARKANA DIVISION**

**CHEETAH OMNI, LLC,
Plaintiff,**

v.

**LEVEL 3 COMMUNICATIONS, INC.
and INFINERA CORPORATION,
Defendants.**

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No. 5:06CV101

AMENDED MEMORANDUM OPINION AND ORDER

The above-referenced case was referred to the undersigned United States Magistrate Judge for pre-trial purposes in accordance with 28 U.S.C. § 636. Before the Court are Plaintiff's Opening Claim Construction Brief (Dkt. No. 128), Defendants' Response (Dkt. No. 130), Plaintiff's Reply (Dkt. No. 133), and Defendants' Sur-Reply (Dkt. No. 134). Also before the Court are the Local Patent Rule ("P.R.") 4-3 Joint Claim Construction and Prehearing Statement (Dkt. No. 127) and the P.R. 4-5(d) Joint Claim Construction Chart (Dkt. No. 132) ("JCCC").

A claim construction hearing, in accordance with *Markman v. Westview Instruments*, 52 F.3d 967 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996), was held in Texarkana on July 16, 2013. After hearing the arguments of counsel and reviewing the relevant pleadings, presentation materials, other papers, and case law, the Court finds the disputed terms of the patents-in-suit should be construed as set forth herein.

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I. BACKGROUND

Plaintiff filed suit on May 9, 2006, alleging infringement of United States Patent No. 6,795,605 (“‘605 patent”). Plaintiff’s Second Amended Complaint, filed November 28, 2006, added allegations of infringement of United States Patent No. 7,142,347 (“‘347 patent”).

The parties agreed to a stay of the above-captioned case pending resolution of reexamination proceedings at the United States Patent and Trademark Office (“PTO”) as to both patents-in-suit, Reexamination Serial Nos. 95/000,239 (as to the ‘347 patent) and 95/000,240 (as to the ‘605 patent). The Court entered the stay on April 12, 2007. Dkt. No. 58. On January 27, 2010, Plaintiff moved to lift the stay, citing the PTO’s December 4, 2009 Action Closing Prosecution in the reexamination of the ‘347 patent. Dkt. No. 62. The Court denied Plaintiff’s motion, noting that reexamination proceedings had not been finalized and that no new circumstances warranted departing from the parties’ express agreement to stay the above-captioned case during reexamination. *See* Dkt. No. 76, 4/16/2010 Order; *see also* Dkt. No. 82, 8/24/2010 Order (denying Plaintiff’s motion for reconsideration). Plaintiff re-urged its motion again on March 31, 2011, but the Court again found no new circumstances warranting a lift of the stay. Dkt. No. 88, 5/12/2011 Order. Finally, Plaintiff renewed its motion a second time on November 9, 2012, noting that the PTO’s Patent Trial and Appeal Board (“PTAB”)¹ had issued rulings upholding the validity of the patents-in-suit. Dkt. No. 93. The Court granted Plaintiff’s motion and lifted the stay on January 8, 2013. Dkt. No. 96.

As for the current status of the reexaminations, Defendants submit:

¹ Because of a change in name and responsibilities, this administrative panel is sometimes referred as the Patent Trial and Appeal Board (“PTAB”) and sometimes as the Board of Patent Appeals and Interferences (“BPAI”). The name change is of no consequence to the present Memorandum Opinion and Order. For simplicity, the Court will refer only to the “PTAB.”

The USPTO's decisions in both *inter partes* reexaminations are currently on appeal at the Federal Circuit with respect to several issues unrelated to this claim construction hearing. However, until both of these appeals are completed, the reexaminations are not complete and [Plaintiff] cannot assert infringement of the pending reexamination claims (*e.g.*, amended claim 11 of the '605 patent) because these claims are [not] legally operative until the Reexamination Certificate issues. See 37 C.F.R. 1.997.

The patents-in-suit generally relate to optical networking equipment for receiving, processing, and transmitting optical data signals across an optical communications network. Such equipment can include micro-electro-mechanical systems ("MEMS"), for example, optical switching elements comprising movable mirrors, which themselves are also sometimes referred to with the "MEMS" acronym (Micro-Electro-Mechanical Switches). The '605 patent, titled "Micromechanical Optical Switch," issued on September 21, 2004. The Abstract of the '605 patent states:

An optical switch element is described, which includes a fixed layer disposed outwardly from a substrate and a movable mirror assembly disposed outwardly from the fixed layer. The moveable mirror assembly is operable to move relative to the fixed layer responsive to a voltage applied to the movable mirror assembly. In a particular embodiment, the movable mirror assembly includes an inner strip spaced apart from the fixed layer by a first distance and an outer strip disposed approximately adjacent to the inner strip and spaced apart from the fixed layer by a second distance which is greater than the first distance. The optical transmission of the optical switch element changes depending on the position of the movable mirror assembly.

The '347 patent, titled "Method and System for Processing Photonic Systems Using Semiconductor Devices," issued on November 28, 2006. The Abstract of the '347 patent states:

An optical processing system includes an amplifier, a receiving device, an electronic processor, and a transmitting device. The receiving device includes a first wave-guide based router and an array of detectors. The array of detectors receives the first optical signals and converts the first optical signals into an electrical signal. The transmitting device includes an optical switching array that is receives [*sic*] the second optical signals and to perform [*sic*] an optical switching operation on the second optical signals. The transmitting device also includes a second wave-guide based router that is operable to receive the second optical signals and to combine the second optical signals into an output optical

signal. In one particular embodiment, the first wave-guide based router and the array of detectors are co-located on a first semiconductor substrate, and the array of modulators and the second wave-guide based router are co-located on a second semiconductor substrate.

The '347 patent is a descendent of the '605 patent, through a series of continuation applications, and both of the patents-in-suit bear an earliest priority filing date of August 1, 2000. The technology summary provided by Defendants in their response brief is also helpful background:

The patents-in-suit are directed to a telecommunications device that selectively routes optical signals in the optical domain. According to the patents-in-suit, while fast optical transmission technology was already commercially available by 2000, optical routing was not yet fully developed. The patents-in-suit explain that network equipment had to convert optical signals to electronic form before routing, which allegedly slowed down the routing operation. The patents-in-suit and [Plaintiff's] brief point out that inability to selectively route optical signals restricted the ability of network designers to accomplish data communications in the optical domain.

To address this issue, the patents-in-suit describe a router architecture for optically routing the "payload" carried in data packets. In the context of the patents-in-suit, an optical signal is a sequence of light pulses that represent data in digital form. Each light pulse is a binary digit (or "bit") having a "0" or "1" value. Sequences of bits represent information such as text, voice or video carried by the optical signals. The data bits in each optical signal are segmented into "packets" of a fixed size (e.g., 32 bits), each of which has a header portion and a payload portion. A data "packet" is analogous to a mail envelope with a letter inside – the smaller "header" portion specifies the destination address, while the larger "payload" portion carries the actual information (the content of the letter). The patents-in-suit disclose a router that converts the header bits to electronic form and processes the headers electronically, while routing the larger payload portion in the optical domain at significantly higher data rates.

Dkt. No. 130 at 3-4 (citations omitted).

The '347 patent and the '605 patent share a common specification and a common set of figures. For convenience, the Court's discussion will cite the specification and figures of only the '605 patent.

The above-captioned case is substantively related to two prior cases brought by Plaintiff in this Court: *Cheetah Omni LLC v. Samsung Electronics America, Inc., et al.*, Civil Action No.

6:08-cv-279, ended in a stipulated judgment of non-infringement shortly after the Court's claim construction ruling (*see id.*, Dkt. Nos. 166, 168 & 169), and the Court of Appeals for the Federal Circuit affirmed the judgment, 397 Fed. App'x 644 (Fed. Cir. Oct. 12, 2010); and *Cheetah Omni, LLC v. Verizon Services Corp., et al.*, Civil Action No. 6:09-cv-260, ended in a jury verdict of infringement and no invalidity on March 18, 2011 (*see id.*, Dkt. No. 439), and after oral argument on post-trial motions the parties jointly moved to dismiss (*see id.*, Dkt. Nos. 500, 501 & 502).

II. LEGAL PRINCIPLES

The claims of a patent define the invention to which the patentee is entitled the right to exclude. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). Claim terms are given their ordinary and customary meaning to one of ordinary skill in the art at the time of the invention, unless there is clear evidence in the patent's specification or prosecution history that the patentee intended a different meaning. *Phillips*, 415 F.3d at 1312-13. Claim construction is informed by the intrinsic evidence: the patents' specification and file histories. *Id.* at 1315-17. Courts may also consider evidence such as dictionary definitions and treatises to aid in determining the ordinary and customary meaning of claim terms. *Phillips*, 415 F.3d at 1322. Further, "[o]ther claims, asserted and unasserted, can provide additional instruction because 'terms are normally used consistently throughout the patent.'" *SmartPhone Techs. LLC v. Research in Motion Corp.*, No. 6:10-CV-74-LED-JDL, 2012 WL 489112, at *2 (E.D. Tex. Feb. 13, 2012) (citing *Phillips*, 415 F.3d at 1314). "Differences among claims, such as additional limitations in dependent claims, can provide further guidance." *Id.*

A court should "avoid the danger of reading limitations from the specification into the claim." *Phillips*, 415 F.3d at 1323. For example, "although the specification often describes very specific embodiments of the invention, [the Federal Circuit has] repeatedly warned against

confining the claims to those embodiments.” *Id.* The Federal Circuit has “expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.” *Id.* This is not only because of the requirements of Section 112 of the Patent Act, but also because “persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments.” *Id.* Limitations from the specification should only be read into the claims if the patentee “acted as his own lexicographer and imbued the claim terms with a particular meaning or disavowed or disclaimed scope of coverage, by using words or expressions of manifest exclusion or restriction.” *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369 (Fed. Cir. 2003) (citations omitted); *Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1367 (Fed. Cir. 2012).

Similarly, the prosecution history may not be used to infer the intentional narrowing of a claim absent the applicant’s clear disavowal of claim coverage. *Superguide Corp. v. DirecTV Enters.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (citations omitted). “To be given effect, such a disclaimer must be made with reasonable clarity and deliberateness.” *Id.*

Guided by these principles of claim construction, this Court directs its attention to the patents-in-suit and the disputed claim terms.

III. CLAIM CONSTRUCTION

The parties have agreed that the terms “to receive at least a portion of at least one of the plurality of optical signal wavelengths” and “to receive at least a portion of [at least some of the] [a] first plurality of optical signal wavelengths” should “be afforded [their] plain and ordinary meaning.” Dkt. No. 128 at 6.

The parties have submitted the following seven disputed terms for construction, four of which contain the phrase “optical switching.”

A. “optical switching” terms

<p align="center">“optical switching element” (‘605 patent, claims 1, 7, 10, 11, 12, 17, 18 & 33)</p>	
Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“a device whose optical transmission properties can vary a signal by changing the direction of a signal or adding information to the signal”	“a device that selectively routes/switches optical signal wavelengths from one path to another”
<p align="center">“an optical switching operation on [the] at least one [of the at least some] of the plurality of optical signal wavelengths” (‘605 patent, claims 1 & 24)</p>	
Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“an act or process applied to the at least one of the plurality of optical signal wavelengths to either change direction of the signal or add information to the signal”	“selective routing/switching of at least one of the plurality of optical signal wavelengths from one path to another”
<p align="center">“an optical switching operation on at least some of the [second] plurality of optical signal wavelengths” (‘347 patent, claims 1 & 13)</p>	
Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“an act or process applied to the at least one of the plurality of optical signal wavelengths to either change direction of the signal or add information to the signal”	“selective routing/switching of at least some of the optical signal wavelengths from one path to another”

<p style="text-align: center;">“optical switching array” (‘605 patent, claims 20 & 24; ‘347 patent, claims 1 & 13)</p>	
Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“a plurality of devices arranged in a regular pattern whose optical transmission properties can vary a signal by changing the direction of a signal or adding information to the signal”	“an array of devices that each selectively routes/switches optical signal wavelengths from one path to another”

JCCC at 5-7.

(1) Parties’ Positions

Plaintiff submits that “the parties differ on whether optical switching can add additional information to the signal.” Dkt. No. 128 at 11. Plaintiff notes that claim 7 of the ‘605 patent recites a “modulator,” which Plaintiff submits is a well-known structure for adding information to a signal. *Id.* Plaintiff argues that “[t]hrough switching operations, the electro-optic router of Figure 8 receives optical signals, may alter the header information, and routes the processed optical signals.” *Id.* at 12. Plaintiff urges that Defendants’ proposal to exclude adding information would improperly limit the claims to specific embodiments disclosed in the specification. *Id.* at 12-14.

Defendants respond that “[Plaintiff] attempts to improperly conflate optical switching and modulation because Defendants’ accused products do not include optical switches that route optical signals.” Dkt. No. 130 at 1. Defendants submit that after filing suit in 2006, Plaintiff served infringement contentions that identified Electro-Absorption Modulators (“EAMs”) in Defendants’ products as the claimed “optical switching elements.” *Id.* Yet, Defendants argue, “[t]he patents-in-suit survived the reexaminations because [Plaintiff] and the USPTO agreed to limit the ‘optical switching’ claim terms to their conventional meaning - *i.e.*, selective routing

of optical data signals from one path to another,” *not* modulation and modulators. *Id.* at 2.

Defendants cite the PTO’s statements in an Action Closing Prosecution, coupled with Plaintiff’s “cho[ice] to stay silent and accept the examiner’s reasons for allowance.” *Id.* at 9. Defendants also cite Plaintiff’s arguments distinguishing the “amplitude modulators” disclosed in, for example, the “Glance” reference (U.S. Patent No. 5,764,821). *Id.* at 12-13; *see id.* at 14-18. Defendants further emphasize that “[t]he specification never describes optical switches performing modulation.” *Id.* at 11; *see id.* at 20. As to the dependent claims that recite modulators, Defendants respond that “these claims were drafted many years after the initial patent application was filed in order to specifically cover [Defendant] Infinera’s products without any regard for any supporting disclosure in the specification.” *Id.* at 21.

Finally, Defendants cite an extrinsic technical dictionary definition of “optical switch” as meaning “a switch that enables optical signals in a dielectric waveguide, such as an optical fiber, . . . to be (a) selectively switched from one circuit or path to another.” *Id.* at 19 (quoting *Fiber Optics Standard Dictionary* 701 (3d ed. 1997)). Defendants also note Plaintiff’s own cited definition of “optical switch” as explaining that “light may be deflected away from a detector, thus switching the beam.” *Id.* (citing Dkt. No. 127 at 15, 18, 22-23 & 28-29).

Plaintiff replies that “the specification of the patents at issue teaches that the optical switching elements of [the] ‘605 and ‘347 Patents add information to the signal by appending a header to the payload. For example, Claim 7 of the ‘605 patent claims an optical switching element comprising a modulator.” Dkt. No. 133 at 2. As to the reexamination, Plaintiff argues that although the patentee distinguished the modulators disclosed in Glance, for example, the patentee did not state that the optical switching elements of the patents-in-suit cannot have any modulation functions. *Id.* at 3.

In sur-reply, Defendants reiterate that “the claims were allowed by the Examiner (at [Plaintiff’s] urging) because the claimed ‘optical switching’ devices must, at a minimum, selectively route optical signals from one path to another.” Dkt. No. 134 at 3. Defendants also disagree with Plaintiff’s argument that “description in the patents-in-suit of processing and associating packet header information with its payload constitutes a modulation process” *Id.*

At the July 16, 2013 hearing, Plaintiff emphasized disclosure of optical switching by a modulator and disclosure of various kinds of modulators. *See* ‘605 patent, 12:3-15 (noting that “Lithium Niobate, semiconductor optical amplifiers, or electro-absorption modulators can switch . . . much faster” than required but are “prohibitively expensive”) & 13:27-38 (“[I]f switch elements 352 and 354 are in phase, then the phase pattern is symmetric and it couples to fiber 360. A phase difference of say, 180 degrees gives rise to an anti-symmetric mode, which prevents coupling between fiber 360 and switch elements 352 and/or 354.”). Plaintiff explained that although modulators might have been faster than necessary at the time of the patent applications, the specification does not state that modulators should not be used. Plaintiff suggested that today’s higher network speeds may warrant the expense of using modulators. Plaintiff also urged that modulation in the form of alternately blocking and not blocking light is a disclosed embodiment that is encompassed by Plaintiff’s proposal of adding information to the signal. *See id.* at 2:3-5, 2:26-29, 2:39-41, 8:1-8, 10:44-54 & 13:27-38. Finally, Plaintiff argued that Defendants’ proposal is not only too narrow but also too broad because it would read on a demultiplexer, which is not a switch.

Defendants responded that whereas selectivity is required under Defendants’ proposed construction, the wavelength splitting performed by a demultiplexer is automatic, not selective.

Defendants also argued that to whatever extent a header is converted to electrical signals and modified by the electronic processor, any modulation of those electrical signals onto optical signal wavelengths is performed by the electronic processor, not the switching array.

(2) Court's Construction

Claim 1 of the '605 patent recites (emphasis added):

1. An optical processing device, comprising:
 - a wave-guide based router operable to separate an input optical signal into a plurality of optical signal wavelengths; and
 - a linear array of *optical switching elements* located on a single semiconductor substrate, each of the *optical switching elements* operable to receive at least a portion of at least one of the plurality of optical signal wavelengths and to perform *an optical switching operation on the at least one of the plurality of optical signal wavelengths*.

Claim 1 of the '347 patent recites (emphasis added):

1. An optical processing system, comprising:
 - an optical amplifier operable to receive an input optical signal from an optical communication link and to at least partially compensate for losses in the input optical signal;
 - a receiving device coupled to the optical amplifier and operable to receive the input optical signal, the receiving device comprising:
 - a first wave-guide based router operable to separate the input optical signal into a first plurality of optical signal wavelengths; and
 - a linear array of wavelength detectors operable to receive at least a portion of at least some of the first plurality of optical signal wavelengths and to convert the at least some of the first plurality of optical signal wavelengths into one or more electrical signals, wherein the first wave-guide based router and the linear array of wavelength detectors are co-located on a first semiconductor substrate;
 - an electronic processor operable to receive at least a portion of the one or more electrical signals and to perform an electronic processing operation on at least one of the one or more electrical signals and to generate, based at least in part on the at least one processed electrical signal, a second plurality of optical signal wavelengths;
 - a transmitting device coupled to the electronic processor and operable to receive at least a portion of the second plurality of optical signal wavelengths, the transmitting device comprising:

- an *optical switching array* comprising a linear array of modulators and operable to receive at least some of the second plurality of optical signal wavelengths, at least some of the modulators operable to perform *an optical switching operation on at least some of the second plurality of optical signal wavelengths*; and
- a second wave-guide based router operable to receive the at least some of the second plurality of optical signal wavelengths and to combine at least the at least some of the second plurality of optical signal wavelengths into an output optical signal, wherein the linear array of modulators and the second wave-guide based router are co-located on a second semiconductor substrate.

Claim 7 of the ‘605 patent recites:

7. The optical processing device of claim 1, wherein each optical switching element comprises a modulator.

A dependent claim is presumed to be narrower than the claim from which it depends.

See, e.g., AK Steel Corp. v. Sollac & Ugine, 344 F.3d 1234, 1242 (Fed. Cir. 2003). The presence of a modulator in claim 7 therefore suggests that a modulator is also within the scope of claim 1 of the ‘605 patent. Yet, this type of presumption is “not a hard and fast rule and will be overcome by a contrary construction dictated by the written description or prosecution history.” *Regents of Univ. of Cal. v. Dakocytomation Cal., Inc.*, 517 F.3d 1364, 1375 (Fed. Cir. 2008) (citation and internal quotation marks omitted); *see, e.g., ERBE Elektromedizin GmbH v. Canady Tech. LLC*, 629 F.3d 1278, 1286 (Fed. Cir. 2010).

The Background of the Invention discloses the desirability of routing light beams directly rather than converting, processing, and converting again:

The ability to transmit information in the optical domain has greatly enhanced the speed and bandwidth of data communications. In comparison, the inability to selectively *route logical signals that are transmitted in the optical domain* has restricted the ability of network designers to accomplish data communications solely in the optical domain. Accordingly, before a signal can be *routed or switched* it must first be converted into electrical signals which can be logically processed using conventional electrical digital computing systems.

There have been a number of attempts to create a workable *optical switch architecture which allows for the selective routing of light beams carrying data communications*. Some of these solutions have involved the formation of micromechanical structures using semiconductor processing techniques. These micromechanical structures typically do not provide suitable speed or reliability for cost-effective commercial applications. For example, many micromechanical structures suffer from air damping effects, which increase the required drive voltage and slow the operation of the device.

‘605 patent, 1:24-44 (emphasis added). The specification then characterizes “the present invention” as being more suitable and more economical than modulators:

Existing switching technologies are either too expensive, or too slow for this application. For example, Lithium Niobate, semiconductor optical amplifiers, or *electro-absorption modulators* can switch in less than one nanosecond, a rate much faster than the optimal 100 nanosecond rate. These devices are *prohibitively expensive, particularly when compared to the present invention*. In addition, these devices tend to be polarization sensitive. Liquid crystal devices, thermo-optic devices, and micro-electro-optic switches using a single continuous membrane as a moveable mirror are capable of switching speeds of only up to one microsecond, too slow for optimal operation.

Id. at 12:3-15 (emphasis added). In the disclosed architecture, optical switches are used to direct light beams:

FIG. 6A illustrates one architecture of an optical switching system that may utilize switching element 36 constructed according to the teachings of the present invention. FIG. 6A illustrates a switching element 40 which is placed at an angle to an optical beam 42 and which selectively directs optical beam 42 to a first receiver 44 or a second receiver 46 using the switching element 36. In the illustrated embodiment, when the switching element 36 is in its undeformed state the mirror strips 24 and 26 are in their furthest position from fixed layer 14. In this state, as described previously, the switching element 36 is optically transmissive and the beam 42 will pass through element 36 and strike receiver 46. Optionally, a voltage can be placed between fixed layer 14 and movable mirror layer 22 causing the movable mirror layer 22 to deform towards the fixed layer 14. In this state, element 36 will reflect optical beam 42 toward receiver 44. In this manner, the beam 42 can be switched between receiver 44 and 46.

FIG. 6B illustrates an additional embodiment of a switching system, indicated generally at 48, which also utilizes switching element 36. Switching system 48 comprises a first receiver 50 and a second receiver 52. Switching system 48 is operable to switch an optical beam 54 which first passes through a circulator

system 56. Optical beam 54 then either reflects off of element 36 or passes through element 36 to receiver 52. If element 36 is in its reflective, deformed state, optical beam 54 returns to circulator 56 where the returning beam is directed towards receiver 50. Circulator system 56 is operable to receive and deflect any reflected signal. In this manner, system 48 selectively routes beam 54 to either receiver 50 or 52 depending on whether or not element 36 is activated. System 48 does not require element 36 to be at an angle compared to the path of beam 54 as required with system 40 described with reference to FIG. 6A previously.

Id. at 12:27-60.

Switching array 530 receives processed optical header information from electronic processor 528 and optical payload information from delay line 522, and performs various switching functions on those signals. A multiplexer 536 receives switched optical signals from switching array 530 and transmits switched optical signals 540 to other network elements.

Id. at 15:14-22.

These disclosures in the specification thus characterize “optical switching” as employing switches, not modulators. On one hand, the scope of claim terms generally is not limited to a preferred embodiment described in the patent specification. *Phillips*, 415 F.3d at 1323. On the other hand, “[i]n reviewing the intrinsic record to construe the claims, we strive to capture the scope of the actual invention, rather than strictly limit the scope of claims to disclosed embodiments or allow the claim language to become divorced from what the specification conveys is the invention.” *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1305 (Fed. Cir. 2011); *see also Nystrom v. TREX Co., Inc.*, 424 F.3d 1136, 1144-45 (Fed. Cir. 2005) (construing term “board” to mean “wood cut from a log” in light of the patentee’s consistent usage of the term; noting that the patentee “is not entitled to a claim construction divorced from the context of the written description and prosecution history”).

The prosecution history provides important guidance on this issue. To the extent that Plaintiff disclaimed claim scope in order to distinguish prior art during reexamination, such disclaimers should be given effect during claim construction. *See In re Katz Interactive Call*

Processing Patent Litig., 639 F.3d 1303, 1324-25 (Fed. Cir. 2011) (holding that distinctions the patentee made over prior art during reexamination narrowed the scope of the claims); *see also Ekhian v. Home Depot, Inc.*, 104 F.3d 1299, 1304 (Fed. Cir. 1997) (“[S]ince, by distinguishing the claimed invention over the prior art, an applicant is indicating what the claims do not cover, he is by implication surrendering such protection.”) (citing *Southwall Techs. Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1581 (Fed. Cir. 1995)); *cf. Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1381 (Fed. Cir. 2011) (“The patentee is bound by representations made and actions that were taken in order to obtain the patent.”). Also, “[b]ecause an examiner in reexamination can be considered one of ordinary skill in the art, [the examiner’s] construction of the asserted claims carries significant weight.” *St. Clair Intellectual Prop. Consultants, Inc. v. Canon Inc.*, Nos. 2009-1052, 2010-1137, -1140, 2011 WL 66166, at *6 (Fed. Cir. Mar. 29, 2011). Finally, even in the absence of an express disclaimer, the claims should nonetheless be construed in light of the context of all of the intrinsic evidence, including the prosecution history. *See Phillips*, 415 F.3d at 1317.

During reexamination of the ‘605 patent, Plaintiff distinguished U.S. Patent No. 5,414,548 (“Tachikawa”), which disclosed electrical/optical (“E/O”) converters based on lithium niobate modulators:

It cannot be argued that a “broadest reasonable interpretation” of “optical switching elements” encompasses optical signal generators, such as E/O converter 54 of Tachikawa. No reasonable interpretation would render a definition of “optical switching elements” that would encompass these structures. Simply put, an E/O converter generates optical signal wavelengths but does not switch optical signal wavelengths. . . . [T]he optical switching element of Claim 11 cannot encompass the E/O converter 54 of Tachikawa because the E/O converter generates optical signal wavelengths but does not switch optical signal wavelengths.

Dkt. No. 130, Ex. 8, 6/4/2009 Amendment at 13 (emphasis omitted). The PTO agreed:

The rejection over Tachikawa is not adopted because 3PR [(Third Party Requestor)] identifies the E/O converters of Tachikawa utilizing LiNbO3 [(lithium niobate)] modulators as meeting the claimed ‘optical switching elements’. . . . However, one of ordinary skill in the art (e.g. an optical engineer) would understand that an E/O converter is a means of converting electrical signals to optical signals and not an optical switch, which selectively switches from one circuit path to another. (*Fiber Optics Standard Dictionary*, pg. 701). For at least this reason, the proposed rejections over Tachikawa are not adopted.

Dkt. No. 130, Ex. 4, 6/22/2010 Action Closing Prosecution at 23 (emphasis omitted); *see id.* at 23-32 (similar). Thus, the patentee and the PTO agreed that electrical/optical converters, which include modulators for generating optical signals based on electrical signals, do not constitute optical switching elements.

Plaintiff also distinguished United States Patent No. 5,764,821 (“Glance”):

At Pages 37-38, the Office Action adopts the Requester’s argument that active sessions [*sic*, sections] 50 operate as optical switching elements, but this is incorrect. As discussed in Patent Owner’s Previous Response, *Glance* discloses that active sessions 50 operate as **either a receiver or a transmitter, but not an optical switch**. . . . *Glance* does not teach or suggest that active sessions 50 are operable to **receive** optical signal wavelengths **and perform an optical switching operation**. Rather, *Glance* discloses that that, when acting in the first mode, active sessions 50 receives [*sic*] an optical signal it **absorbs but does not switch**, and when acting in the second mode it does not receive optical wavelengths and perform an optical switching operation.

Dkt. No. 130, Ex. 8, 6/4/2009 Amendment at 16 (emphasis in original). The PTO agreed:

As to 3PR argument (ii), the crux of the argument is that PO [(Patent Owner)] has allegedly acted as his own lexicographer and defined modulators as optical switching elements. Since **Glance’s** active elements #50 act as modulators (i.e., “transmit” mode), 3PR alleges the active elements #50 are optical switches. However, as set forth above, the Examiner is not persuaded PO has acted as his own lexicographer and defined modulators as optical switches. Further, one of ordinary skill in the art (e.g. an optical engineer) understands modulators are not optical switches. As such, this argument is not persuasive.

* * *

Active element #50 is a semiconductor device which has three modes. . . . The second mode is “transmit” wherein the active element #50 acts as an amplitude modulator to transmit data at the carrier frequency. . . . The Examiner does not

consider “receive”, “transmit”, or “amplify” to be optical switching functions because they do not selectively switch from one circuit path to another. For at least this reason, the rejections are not adopted.

Dkt. No. 130, Ex. 4, 6/22/2010 Action Closing Prosecution at 17 & 41 (emphasis in original); *see id.* at 42-55 (similar); *see also id.* at 21-22, 75 & 96-99 (similar regarding transmitters in U.S. Patent No. 5,923,449 (“Doerr”), modulators in United States Patent No. 5,793,912 (“Boord”), converters in United States Patent No. 5,912,751 (“Ford”), and electrical/optical converters in U.S. Patent No. 6,512,612 (“Fatehi”)). Thus, the patentee explained that transmitters and converters are not optical switches.

During reexamination of the ‘347 patent, the PTO rejected claims directed to an absence of lithium niobate modulators, noting the specification’s lack of disclosure of modulators: “[T]he specification does not enable one of ordinary skill in the art to make or use a linear array of modulators operating at a 10 Gb/s or higher rate in the absence of Lithium Niobate modulators without undue experimentation.” Dkt. No. 130, Ex. 5, 4/8/2010 Right of Appeal Notice at 6-7. Instead, in the specification’s only reference to modulators, the patentee disparaged them as being “prohibitively expensive” and “polarization sensitive.” ‘605 patent, 12:4-11. On appeal to the PTAB, Plaintiff argued that “[m]odulators 27 of modulator array 26 [in United States Patent No. 5,526,155 (“Knox”)] do not perform an optical switching operation and therefore fail to anticipate the claimed optical switching array.” Dkt. No. 130, Ex. 10, 8/20/2010 Patent Owner/Respondent Brief at 16.

Finally, in the PTAB’s ruling as to the ‘605 patent, the PTAB reiterated the distinction between modulators and optical switches:

The Examiner . . . f[ound] that “an optical switch selectively switches from one circuit path to another,” citing an external source ([ACP 14]). The Examiner also disagree[d] that Respondent acted as his own lexicographer, because the Examiner d[id] not find persuasive Appellant’s argument that claim 39, issued in

the '605 Patent, sought to define the modulators as performing an optical switching operation (ACP 15). We agree and adopt these findings.

* * *

As discussed *supra*, the Examiner finds that Respondent did not act as his own lexicographer and did not redefine modulators as optical switches, and that ordinary skilled artisans would not have found modulators to be the same as optical switches (ACP 65). . . . [T]he Examiner did not err in not adopting the proffered rejection of claim 20

Dkt. No. 130, Ex. 11, 3/30/2012 Decision on Appeal at 8 & 10-11.

In sum, the patentee definitively stated, and the PTO evidently understood, that modulating a signal is not the same as optically switching a signal. *See Omega Eng'g v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed. Cir. 2003) (“As a basic principle of claim interpretation, prosecution disclaimer promotes the public notice function of the intrinsic evidence and protects the public’s reliance on *definitive* statements made during prosecution.”) (emphasis added). Even though the creation of a “processed optical signal” may involve modulation at some point in the system (*see* '605 patent, 15:6-15:19), nothing in the specification or the prosecution history suggests that adding information to a signal constitutes “switching.” Still, the patentee’s above-cited statements distinguishing the modulators disclosed in various references do not amount to a disavowal of any structure that can modulate. That is, the patentee did not disclaim structures that perform modulation *in addition to* optical switching.

Ultimately, the parties dispute whether the “optical switching” terms encompass merely adding information to a signal. As discussed above, the patentee did not state during reexamination that optical switching necessarily excludes modulation. But Plaintiff does not seek merely to allow for the presence of modulation. Plaintiff’s proposed constructions seek to encompass “changing the direction of a signal *or* adding information to the signal,” that is, either switching *or* modulating. Because the patentee repeatedly, definitively stated during

reexamination that modulation alone does not constitute optical switching, as discussed above, Plaintiff's proposed constructions are hereby rejected. *See Omega Eng'g*, 334 F.3d at 1324.

The disclosures in the specification regarding blocking and unblocking light, which were emphasized by Plaintiff at the July 16, 2013 hearing (*see* '605 Patent at 2:3-5, 2:26-29, 2:39-41, 8:1-8, 10:44-54 & 13:27-38), are insufficient to overcome this definitive prosecution history and the weight of the other above-quoted disclosures in the specification that refer to "switching" as directing light from one path to another.

As to other evidence, Defendants have cited a technical dictionary, *Fiber Optics Standard Dictionary* (3d ed. 1997) at page 604, which the PTO also cited (*see* above) and which defines "modulator" as "a device that performs modulation, such as imposing an information-bearing signal on a carrier." Dkt. No. 130 at 6 n.4. This dictionary definition, while necessarily of limited weight during claim construction, is nonetheless helpful in understanding the distinction between modulation and switching. *Phillips*, 415 F.3d at 1318 ("We have especially noted the help that technical dictionaries may provide to a court to better understand the underlying technology and the way in which one of skill in the art might use the claim terms.") (citation and internal quotation marks omitted).

As to the proper constructions, Defendants' proposals are consistent with the above-discussed evidence, but Defendants' proposals of "routes/switches" and "routing/switching" are potentially confusing, particularly because they include the word "switches" or "switching" in the constructions for terms that contain those words. The Court therefore omits "switches" and "switching" from the constructions. Further, "routes" and "routing" might be read to encompass multiple switching operations at multiple different locations, so the Court substitutes "directs"

and “directing,” which better connote a discrete selection performed by a particular device. The Court’s constructions are set forth in the following chart:

Disputed Claim Term	Court’s Construction
“optical switching element” (‘605 patent, claims 1, 7, 10, 11, 12, 17, 18 & 33)	“a device that selectively directs optical signal wavelengths from one path to another”
“an optical switching operation on [the] at least one [of the at least some] of the plurality of optical signal wavelengths” (‘605 patent, claims 1 & 24)	“selective directing of at least one of the plurality of optical signal wavelengths from one path to another”
“an optical switching operation on at least some of the [second] plurality of optical signal wavelengths” (‘347 patent, claims 1 & 13)	“selective directing of at least some of the optical signal wavelengths from one path to another”
“optical switching array” (‘605 patent, claims 20 & 24; ‘347 patent, claims 1 & 13)	“an array of devices that each selectively directs optical signal wavelengths from one path to another”

B. “signal”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“a detectable physical quantity by which messages or information can be carried or transmitted” ²	“a representation of information conveyed by a carrier”

JCCC at 4. This disputed term appears in claims 1, 5, 8, 10, 11, 12, 14, 20, 23-25, 30, and 31 of the ‘605 patent and claims 1, 5, and 13 of the ‘347 patent. *Id.*

² In its briefing, Plaintiff argued that no construction is required, but Plaintiff submitted this quoted language as an alternative proposal. *See* Dkt. No. 128 at 17-18; Dkt. No. 133 at 4-6. Also, at the July 16, 2013 hearing, Plaintiff proposed “representation of information,” as discussed below.

(1) Parties' Positions

Plaintiff submits that whereas “Defendants’ construction requires that ‘signal’ be a representation of information rather than carry information,” “the specification clearly provides that signals are transmitted even where no information is present.” Dkt. No. 128 at 17-18. Plaintiff similarly cites dependent claims in which optical switching elements are recited as passing a received wavelength even when no voltage is applied to the optical switching element. *Id.* at 18. Finally, Plaintiff submits that to whatever extent the intrinsic evidence does not resolve the dispute, Plaintiff’s proposal is consistent with an extrinsic dictionary definition of “signal” as meaning “a detectable physical quantity or impulse (as a voltage, current, or magnetic field strength) by which messages or information can be transmitted.” *Id.* (citing Dkt. No. 127 (quoting <http://www.merriamwebster.com/dictionary/signal>)).

Defendants respond that “[t]he dispute between the parties boils down to whether a ‘signal,’ in the context of the patents-in-suit, requires transmission of information.” Dkt. No. 130 at 23. Defendants submit that this dispute stems from the parties’ dispute regarding whether modulation can constitute optical switching, discussed above, because Plaintiff’s interpretation of “signal” “allows it to read a ‘signal’ in the claims as an unmodulated (*i.e.*, non-information bearing) carrier to which information is added via modulation.” *Id.* Defendants argue that “[w]hile the term ‘signal’ is not explicitly defined in the specification, the patents-in-suit repeatedly refer to ‘signal’ as a representation of information/data.” *Id.* As to Plaintiff’s reliance on the specification, Defendants respond that:

[Plaintiff] incorrectly suggests that not applying voltage is equivalent to not adding information to the signal, which is absolutely not what Column 4:3-5 and claim 10 describe. Instead, Column 4:3-5 and claim 10 describe a fault tolerant operation of the electro-optic router, in which information-bearing optical signals are passed through the router even when it cannot actively route/switch these signals due to the lack of voltage. This is possible because optical switches are

substantially transmissive in the no-voltage state and therefore can simply pass through the incoming optical signals.

Id. at 25 (citations omitted).

Plaintiff replies that “Defendants seemingly conflate a kind of signal with the signal itself and essentially append a generic modifier to the actual term to be constructed. Defendants’ proposed construction shifts the focus (and function) of the term ‘signal’ from being a carrier to the thing being carried.” Dkt. No. 133 at 5. Plaintiff concludes that “[s]eeking to complicate an already clear term, Defendants tacitly ask this Court to construe ‘a [something] signal,’ but provide no indication of the ‘something’ that modifies signal.” *Id.* (square brackets in original).

At the July 16, 2013 hearing, Plaintiff proposed construing the disputed term to mean “representation of information.” Plaintiff thus substantially abandoned the proposal set forth in its opening brief. Defendants responded that Plaintiff’s proposal still fails to require conveyance of information. Defendants argued that if the information goes nowhere, then there is no “signal.” The Court proposed construing the term to mean “a representation of information, conveyed over a medium.” Plaintiff responded that it would be agreeable to construing the term to mean “representation of information conveyed.” Plaintiff urged that there may be many different types of signals, such as logical signals, electrical signals, and optical signals, that can be conveyed in various different ways. Plaintiff also argued that “over a medium,” like Defendants’ proposal of “by a carrier,” would be too limiting because there might be multiple mediums involved, such as wires and fiber optic cables. Defendants replied that transmission of signals in a network requires a carrier.

(2) Court’s Construction

Although Plaintiff has proposed that no construction is required, the parties have presented a “fundamental dispute regarding the scope of a claim term,” and the Court has a duty

to resolve that dispute. *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362-63 (Fed. Cir. 2008).

The specification discloses a context in which “signals” are used in the patents-in-suit:

The ability to transmit information in the optical domain has greatly enhanced the speed and bandwidth of data communications. In comparison, the inability to selectively *route logical signals that are transmitted in the optical domain* has restricted the ability of network designers to accomplish data communications solely in the optical domain. Accordingly, before a signal can be routed or switched it must first be converted into *electrical signals* which can be logically processed using conventional electrical digital computing systems.

There have been a number of attempts to create a workable *optical switch architecture which allows for the selective routing of light beams carrying data communications*.

‘605 patent, 1:24-36 (emphasis added). The specification further discloses that a signal can include two components: “[o]ptical signal 512 comprises header information 514 and signal payload 516.” *Id.* at 14:30-31; *see id.* at 14:65-15:2 & Fig. 8.

In operation, electro-optical router 500 receives a plurality of optical signals 512 and depending on, for example, the signal and line rates, may amplify those signals at optical amplifier 510. Fiber optic tap 518 *receives optical signals 512 and taps header information 514 from optical signals 512*. Header information 514 is passed to demultiplexer 524, while *payload information 516* is communicated to delay line 522. Delay line 522 serves as a first-in-first-out (FIFO) buffer. The FIFO buffer length is set so as to provide enough time for electronic processor 528 to process the various header information 514.

While payload information 516 is delayed in FIFO buffer 522, electronic processor 528 converts optical header information 514 into electronic signals, and performs various processing on that header information. After completing processing of the electronic header information, electronic processor 528 converts the electronic header information back into one or more optical signals and transmits those signals to switching array 530.

Switching array 530 receives processed header information and unprocessed payload information 516, and associates the related payload and header information. Optical switching array 530 then switches the *processed optical signals* at rates ranging, for example, from approximately 10 to 100 nanoseconds or longer.

Id. at 14:63-15:19 (emphasis added). These disclosures demonstrate that a “signal” conveys information. As to what is used to convey this information, the specification refers to a “medium,” such as optical fibers:

FIG. 9 is a block diagram showing an exemplary fault tolerant network 600 constructed according to the teachings of the present invention. Fault tolerant network 600 includes a fiber core 610 comprising two or more edge nodes 612-616 coupled to at least one fault tolerant node 620 by communication links 618 operable to facilitate communication of optical signals. In this example, communication links 618 comprise single mode optical fibers. Communication links 618 could, however, comprise another *medium operable to facilitate transmission of optical signals* comprising one or a plurality of wavelengths.

Id. at 15:47-57 (emphasis added).

As to extrinsic evidence, Defendants submit that the *Fiber Optics Standard Dictionary* (3d ed. 1997), which the PTO cited during reexamination of the patents-in-suit, defines “signal” as “a representation of information conveyed by a carrier.” *Id.* at 914; Dkt. No. 130 at 24.

Finally, this Court construed the term “optical signal” in a case brought by Plaintiff asserting United States Patent No. 7,339,714 (“‘714 patent”), which also relates to optical switching and which names the same inventor as the patents asserted in the above-captioned case. *See, e.g.*, ‘714 patent, Abstract. The Court construed “optical signal” to mean “light beam carrying information,” noting that “[t]he use of the term ‘signal’ itself also implies information.” *Cheetah Omni, LLC v. Samsung Elecs. Am., Inc.*, No. 6:08-cv-279, 2009 WL 5196721, at *2-*3 (E.D. Tex. Dec. 21, 2009) (Davis, J.). Although the ‘714 patent has no apparent familial relation to the patents-in-suit, the analysis in *Samsung* is nonetheless of some persuasive value, particularly given the similarity in technology, the identity of inventorship, and that the Federal Circuit affirmed the *Samsung* stipulated final judgment, which was based on the Court’s construction of “optical signal.” No. 6:08-cv-279, Dkt. No. 168 (Dec. 23, 2009) (Joint

Stipulation); *id.*, Dkt. No. 169 (Dec. 30, 2009) (Final Judgment); *Cheetah Omni*, 397 Fed. App'x 644 (affirming, without opinion, pursuant to Federal Circuit Rule 36).

On balance, Plaintiff's original proposal of "a detectable physical quantity by which messages or information can be carried or transmitted" is overbroad because, for example, it would encompass unmodified natural phenomena such as sunlight. Perhaps sunlight could be intermittently obstructed in order to convey information, such as by using Morse code (a series of short or long "ons" separated by "offs"), but the mere possibility that some physical phenomenon *could* be used to carry information is insufficient to constitute a "signal."

Instead, the above-discussed intrinsic evidence demonstrates that a "signal" is a representation of information, wherein that representation is being conveyed over a medium. The extrinsic definitions and the Court's construction of "optical signal" in a similar case, discussed above, are also consistent with such a construction. Defendants' proposal to introduce a "carrier" lacks support in the intrinsic record and is potentially too narrow because an electrical signal could be merely a voltage rather than a modulated carrier. *See* United States Patent No. 5,214,527 ("Chang '527," discussed below) at 3:31-35. The Court therefore adopts the language that both sides have been able to agree upon: "representation of information conveyed." Because the requirement of conveyance implicitly requires the use of some medium, reference to a generic "medium" is unnecessary and is therefore omitted.

The Court therefore construes "**signal**" to mean "**a representation of information conveyed.**"

C. “optical signal wavelength”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“a numerical value of the wavelength of an optical signal” ³	“light carrying information at a wavelength”

JCCC at 5. This disputed term appears in claims 1, 5, 8, 10, 11, 12, 14, 20, 23-25, 30 and 31 of the ‘605 patent and claims 1, 5, and 13 of the ‘347 patent. *Id.*

(1) Parties’ Positions

Plaintiff argues that Defendants’ proposal improperly “use[s] wavelength to define wavelength,” and Plaintiff notes that dependent claim 11 of the ‘347 patent refers to a “wavelength between 1500 and 1600 nanometers,” which is a numerical value. Dkt. No. 128 at 16. Plaintiff submits that Defendants’ proposal would exclude this claimed embodiment and should therefore be rejected. *Id.* at 16-17; *see Vitronics Corp. v. Conceptronic Inc.*, 90 F.3d 1576, 1582-83 (Fed. Cir. 1996) (noting that a claim interpretation in which the only embodiment or a preferred embodiment “would not fall within the scope of the patent claim . . . is rarely, if ever, correct and would require highly persuasive evidentiary support”).

Defendants respond that “[w]hile Defendants do not dispute that wavelengths have numerical values (*e.g.*, 1500 nm), it is clear that by referring to ‘optical signal wavelengths,’ the patent drafter used shorthand to refer to the optical signals transmitted at different wavelengths, not to the actual numerical values of these wavelengths (*i.e.*, 1500 nm), as [Plaintiff] suggests.” Dkt. No. 130 at 26. Defendants explain that “the combined optical signal can only be split into multiple optical signals, not the numerical wavelength values,” and Defendants submit that “all

³ In its briefing, Plaintiff argued that no construction is required, but Plaintiff submitted this quoted language as an alternative proposal. *See* Dkt. No. 128 at 16-17; Dkt. No. 133 at 6-7. Also, at the July 16, 2013 hearing, Plaintiff proposed “information carried by a certain wavelength of light,” as discussed below.

optical components in the specification (switches, detectors, demultiplexors, etc.) operate on optical signals – *i.e.*, optical carriers of specific wavelengths that convey information.” *Id.* at 27. Defendants further explain that “[Plaintiff] clearly misunderstands that optical fibers actually carry light signals having particular wavelengths, not numerical values of the wavelengths themselves. . . . Just as ‘a temperature’ is not carried in a water pipe (but rather water having a certain temperature), a wavelength is not carried in an optical fiber.” *Id.* As to the prosecution history, Defendants argue that “[d]uring reexamination, all parties (including the Examiner) had a common understanding that the ‘optical signal wavelengths’ refer to optical signals of different wavelengths, not the numerical values of these wavelengths.” *Id.*

Plaintiff replies by reiterating its opening arguments. *See* Dkt. No. 133 at 6-7.

At the July 16, 2013 hearing, Plaintiff proposed “information carried by a certain wavelength of light.” Plaintiff thus substantially abandoned the proposal set forth in its opening brief. The Court proposed construing the term to mean “light carrying information at a particular numerical wavelength.” Defendants were agreeable to the Court’s proposed construction, but Plaintiff responded that the Court’s proposal would exclude some of the embodiments disclosed in the specification. Nonetheless, Plaintiff agreed with Defendants that the light carrying the information is modulated at a certain wavelength.

(2) Court’s Construction

Although Plaintiff has proposed that no construction is required, the parties have presented a “fundamental dispute regarding the scope of a claim term,” and the Court has a duty to resolve that dispute. *O2 Micro*, 521 F.3d at 1362-63.

The term “optical signal wavelengths” appears only in the claims of the ‘605 patent. Claim 1 recites (emphasis added):

1. An optical processing device, comprising:
 - a wave-guide based router operable to separate an input optical signal into a plurality of optical signal wavelengths; and
 - a linear array of optical switching elements located on a single semiconductor substrate, each of the optical switching elements operable to receive at least a portion of at least one of the plurality of optical signal wavelengths and to *perform an optical switching operation on the at least one of the plurality of optical signal wavelengths*.

On one hand, this claim language, which recites switching the optical signal wavelengths, suggests that an “optical signal wavelength” is a portion of a signal rather than a numerical value. Likewise, the specification uses “wavelengths” to refer to portions of a signal at different numerical wavelengths:

FIG. 8 is a block diagram of an exemplary electro-optic router 500 constructed according to the teachings of the present invention. . . . In the illustrated embodiment, an optical amplifier 510 resides at the ingress end of the router, which receives optical signals 512 over a communication link 520. . . . In the illustrated embodiment, communication link 520 comprises a single mode fiber carrying, for example, *100 wavelengths ranging from 1500 to 1600 nanometers* and 2.5 Gb/s per channel.

Optical signal 512 comprises header information 514 and signal payload 516. Electro-optic router includes a fiber optic tap operable to communicate a first portion of optical signal 512 to a delay line 522 and a second portion of optical signal 512 to a demultiplexer 524. In the illustrated embodiment, demultiplexer 524 may comprise, for example, a wavelength grating router, operable to *split the incoming signal into a plurality of wavelengths and send the plurality of wavelengths to an array of wavelength detectors 526*.

Electro-optic router 500 also includes an electronic processor 528 operable to receive optical signals from detectors 526, to convert the optical signals to electronic signals, and perform various switching, routing, or other processing functions on the converted electronic signals. Electronic processor 528 is further operable to convert processed electronic signals into optical signals for transmission to a switching array 530.

‘605 patent, 14:30-58 (emphasis added).

Switching array 530 receives processed optical header information from electronic processor 528 and optical payload information from delay line 522, and performs various switching functions on those signals. A multiplexer 536

receives switched optical signals from switching array 530 and transmits switched optical signals 540 to other network elements.

Id. at 15:14-22.

As for the reexamination, the PTO interpreted “optical signal wavelengths” as referring to optical signals:

20. “Electronic Processor coupled to the linear array of wavelength detectors, the electronic processor transmits one or more optical signal wavelengths”

Glance’s circuit #70 of figure 3 does not transmit at least a portion of the one or more signals to active elements #50, because circuit #70 is electrically (not optically) connected to active elements #50. Circuit #70 provides bias currents from #80 to active elements #50 and multiplexer #71 provides a bias current via a DC current through connector #54. (col. 3:40-46)

One of ordinary skill in the art (e.g. an optical engineer) would understand that *electrical* connections do not communicate *optical* signals and as such, **Glance**’s circuit #70 cannot communicate the *optical* signals. For at least this reason, the proposed rejections over **Glance** are not adopted.

Dkt. No. 130, Ex. 4, 6/22/2010 Action Closing Prosecution at 52, ¶ 20 (emphasis in original).

While not binding, this apparent understanding of the PTO carries some persuasive weight.

St. Clair Intellectual Prop. Consultants, 2011 WL 66166, at *6 (“Because an examiner in reexamination can be considered one of ordinary skill in the art, his construction of the asserted claims carries significant weight.”).

On the other hand, Claim 5 of the ‘347 patent refers to “optical signal wavelengths” in terms of numerical values:

5. The optical processing system of claim 1, wherein at least one wavelength of the first plurality of optical signal wavelengths comprises a wavelength between 1500 and 1600 nanometers.

Further, in some contexts, the patents-in-suit refer to “wavelengths” in terms of numerical values:

The optical switching element of the present invention is formed on an outer surface of a substrate 10 shown in FIG. 1A. Substrate 10 may comprise, for example, n-type silicon or indium phosphide. As will be described herein, in one mode of operation, it is advantageous if the substrate is optically transmissive in the *wavelength range* of the optical signal to be switched by the element. To facilitate that mode of operation, in a particular embodiment, a single crystalline silicon substrate can be manufactured so that it is *optically transmissive in the range of wavelengths between approximately 1,300 to approximately 1,700 nanometers* with an *optimal transmissive wavelength of approximately 1,500 nanometers*.

‘605 patent, 4:48-60 (emphasis added); *see also, e.g., id.* at 4:61-5:26 (discussing “optical thickness” of “one-quarter wavelength”).

Claim 5 and the above-cited disclosures of numerical wavelength values are consistent, however, with interpreting “optical signal wavelengths” to refer to signal portions that correspond to particular numerical wavelengths. In other words, “optical signal wavelength” refers to a numerical wavelength *and* to a portion of a signal that is associated with that numerical wavelength. On balance, the context of the claims, the disclosures in the specification, and the understanding of the PTO during prosecution all weigh in favor of finding that the term “optical signal wavelength” refers to light carrying information at a particular numerical wavelength.

The Court therefore construes “**optical signal wavelength**” to mean “**light carrying information at a particular numerical wavelength.**”

D. “operable to communicate one or more signals”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“capable of transmitting or carrying one or more signals” ⁴	“transmitting one or more optical signals”

JCCC at 7. This disputed term appears in claims 11 and 20 of the ‘605 patent. *Id.*

(1) Parties’ Positions

The parties agree that the “linear array of wavelength detectors” in claims 11 and 20 of the ‘605 patent transmits one or more signals. Dkt. No. 130 at 28. The parties dispute whether those signals must be optical signals.

Plaintiff submits that “the specification is unequivocal. The electro-optic router can transmit optical and electrical signals.” Dkt. No. 128 at 21. Plaintiff argues that “Defendants now ask this Court to read the limitation ‘optical signals’ from select paragraphs of the specification into the claims.” *Id.* Plaintiff highlights the principle that if “we once begin to include elements not mentioned in the claim in order to limit such claim . . . we should never know where to stop.” *Id.* at 20 (quoting *McCarty v. Lehigh Valley R.R.*, 160 U.S. 110, 116 (1895)).

Defendants respond that “[w]avelength detectors are only described in the specification with respect to Figure 8,” in which the wavelength detectors transmit optical signals. Dkt. No. 130 at 28. Defendants emphasize that “it is the electronic processor, not the array of wavelength detectors, which converts these received optical signals to electronic form.” *Id.* at 29. Defendants conclude that “[Plaintiff’s] broader construction finds no support in the specification” because “[t]he specification is silent about the detectors being able to transmit or

⁴ In its briefing, Plaintiff argued that no construction is required, but Plaintiff submitted this quoted language as an alternative proposal. *See* Dkt. No. 128 at 19-22; Dkt. No. 133 at 7-10.

communicate anything but optical signals.” *Id.* Finally, Defendants cite reexamination prosecution history in which Plaintiff purportedly distinguished wavelength detectors that did not communicate optical signals. *Id.*

Plaintiff replies that “[p]erhaps more than any of the other claims offered for construction, the meaning of the phrase ‘operable to communicate one or more signals’ is abundantly clear[.]. Indeed, excluding Defendants’ improper inclusion of the term optical, the parties[’] proposed constructions for this phrase are strikingly similar[.]” Dkt. No. 133 at 8. Plaintiff further argues that “[w]hile the specification of the ‘605 and ‘347 Patents disclose that one embodiment permits the transmittal of optical signals, the applicant does not state or suggest that this limitation is required or desirable.” *Id.* at 10.

At the July 16, 2013 hearing, Defendants submitted that although the disputed term refers to “signals” rather than “optical signals,” the specification only enables transmission of optical signals by the wavelength detectors. Defendants argued that the claim scope should be commensurate with this scope of enablement. Plaintiff responded that the specification discloses other types of signals, such as “logical signals” and “electrical signals.” *See* ‘605 patent, 1:24-33.

(2) Court’s Construction

Although Plaintiff has proposed that no construction is required, the parties have presented a “fundamental dispute regarding the scope of a claim term,” and the Court has a duty to resolve that dispute. *O2 Micro*, 521 F.3d at 1362-63.

Plaintiff cites the proposition that “[g]enerally speaking, we indulge a heavy presumption that a claim term carries its ordinary and customary meaning,” and Plaintiff notes that the presumption cannot be overcome “simply by pointing to the preferred embodiment or other

structures or steps disclosed in the specification or prosecution history.” *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366-1367 (Fed. Cir. 2002) (citations and internal quotation marks omitted); Dkt. No. 128 at 13 n.45. While generally accurate, this principle from *CCS Fitness* must be evaluated in light of *Phillips* having later rejected the *Texas Digital* approach in which it was “improper to consult ‘the written description and prosecution history as a threshold step in the claim construction process, before any effort is made to discern the ordinary and customary meanings attributed to the words themselves.” *Phillips*, 415 F.3d at 1320 (quoting *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1204 (Fed. Cir. 2002)).

Plaintiff has also relied upon the following disclosure that a router can receive “electrical and/or optical signals” (*see* Dkt. No. 128 at 21):

In this example, each of edge nodes 612-616 comprises an access router operable to receive electrical and/or optical signals and to convert the electrical signals into optical signals for transmission over fiber core 610. Edge nodes 612-616 provide electronic buffering until the signal is ready to be placed onto the optical backbone 618.

Id. at 16:1-6. As Defendants have countered, however, this passage refers to the input of signals to the router, not the output of the linear array of wavelength detectors within the router, which is at issue here. *See* Dkt. No. 130 at 30.

The specification refers to “optical signals,” to “electrical signals” or “electronic signals,” and to conversion being performed by an electronic processor:

Electro-optic router 500 also includes an electronic processor 528 operable to receive optical signals from detectors 526, to *convert the optical signals to electronic signals*, and perform various switching, routing, or other processing functions on the converted electronic signals. Electronic processor 528 is further operable to *convert processed electronic signals into optical signals for transmission to a switching array 530*.

‘605 patent, 14:39-58 (emphasis added); *see id.* at Fig. 8.

While payload information 516 is delayed in FIFO buffer 522, electronic processor 528 *converts optical header information 514 into electronic signals*, and performs various processing on that header information. After completing processing of the electronic header information, electronic processor 528 *converts the electronic header information back into one or more optical signals and transmits those signals to switching array 530*.

Switching array 530 receives processed optical header information from electronic processor 528 and optical payload information from delay line 522, and performs various switching functions on those signals. A multiplexer 536 receives switched optical signals from switching array 530 and transmits switched optical signals 540 to other network elements.

Id. at 15:6-22 (emphasis added). Thus, communication of “signals,” in general, could refer to communication of optical signals or electrical signals.

Claims 11 and 20 of the ‘605 patent, in which the disputed term appears, expressly recite “optical” signals (emphasis added):

11. The optical processing device of claim 1, further comprising a linear array of wavelength detectors operable to receive at least a portion of at least some of the plurality of *optical signal wavelengths*, the linear array of wavelength detectors *operable to communicate one or more signals* associated with at least some of the plurality of *optical signal wavelengths* to the linear array of optical switching elements.

20. An optical processing device, comprising:

a wave-guide based router operable to separate an input *optical signal* into a plurality of *optical signal wavelengths*; and

a linear array of wavelength detectors located on a single semiconductor substrate and operable to receive at least a portion of at least some of the plurality of *optical signal wavelengths*, the linear array of wavelength detectors *operable to communicate one or more signals* associated with the at least some of the plurality of *optical signal wavelengths* to an optical switching array.

Nonetheless, the specification explains that header information can be processed and used to control an optical switching array that, in turn, is disclosed as being controlled by applying voltages to switches in the array. *See, e.g., ‘605 patent, 12:27-44 & 14:47-15:22.* Because the disclosed voltages are electrical rather than optical, the “one or more signals” in the disputed term could be electrical signals for applying voltages to the switches, thereby directing the

optical signal wavelengths as appropriate. Thus, although the specification discloses a preferred embodiment in which only optical signals are communicated to the array of optical switching elements (*see id.* at 14:39-58 & 15:6-22), Defendants have not sufficiently justified limiting the claims to that preferred embodiment. *See Phillips*, 415 F.3d at 1323.

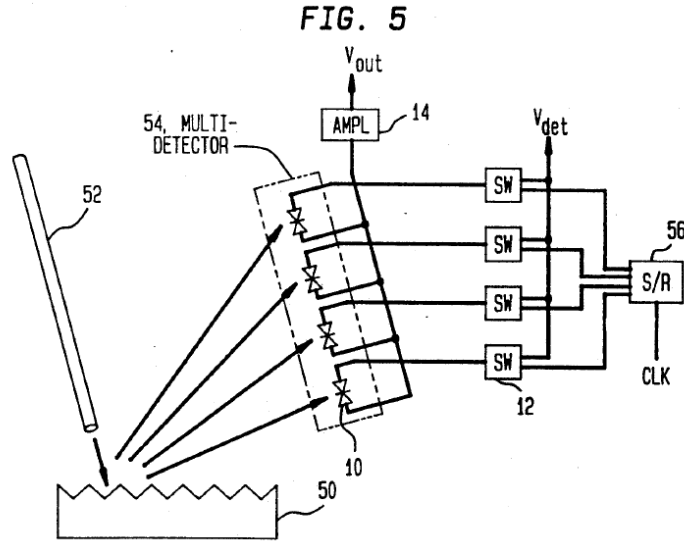
As for the reexamination, Plaintiff distinguished the claimed wavelength detectors from the detectors in United States Patent No. 5,214,527 (“Chang ‘527”):

Claim 20, for example, is not anticipated by Chang ‘527 at least because Chang ‘527 fails to disclose, teach, or suggest “a linear array of wavelength detectors . . . operable to communicate one or more signals associated with the at least some of the plurality of optical signal wavelengths to the optical switching array” The Request relies on the detectors 10 in Figure 5 to teach the “linear array of wavelength detectors” and the switches 12 to teach the “optical switching array,” but this reliance is misplaced. *The detectors 10 are not operable to communicate optical signal wavelengths to switches 12.* Instead, the switches 12 **electrically control** the detectors 10, and the detectors supply their photocurrents to an amplifier 14. See Chang ‘527, Column 3, lines 30-35. Thus, Chang ‘527 fails to disclose “a linear array of wavelength detectors . . . operable to communicate one or more signals associated with the at least some of the plurality of optical signal wavelengths to the optical switching array” and “the optical switching array is operable to receive the one or more signals.”

Reexamination Serial No. 95/000,240 (re-examination of the ‘605 patent), 10/31/2007 Response to *Inter Partes* Reexamination Office Action at 47 (bold in original; italics modified).⁵ At the July 16, 2013 hearing, Defendants stressed their argument that the patentee should be bound by its choice to rely upon the transmission of optical signals from the detectors to the switches as a basis for distinguishing the detectors in Chang ‘527.

Figure 5 of Chang ‘527 is reproduced here:

⁵ Defendants’ response brief cites this document but does not appear to have attached it as an exhibit to Defendants’ brief. Defendants did, however, provide the entire reexamination file histories to the Court in PDF format. The passage quoted here appears on page 850 of 1777 in the reexamination file history for the ‘605 patent, as provided to the Court by Defendants. Also, Defendants’ response brief quotes a portion of this passage. *See* Dkt. No. 130 at 29.



Chang ‘527 also discloses that “[e]ach switch 12 selectively applies a bias voltage supplied by a source of voltage V_{det} to the selected detector 10. All photo-detectors 10 supply their photocurrents to a single amplifier 14, which outputs an amplified signal V_{out} .” Chang ‘527 at 3:31-35.

The above-quoted reexamination response can therefore be fairly read to have distinguished Chang ‘527 based on the “switches 12” in Chang ‘527 not performing *optical* switching and not receiving anything from the “detectors 10.” Instead, the switches provide a bias voltage to electrically control the detectors, which communicate with the amplifier, not the switches, as quoted above. As a result, the patentee did not make any clear, definitive statements requiring that the signals communicated from the wavelength detectors to the optical switching array must be optical signals. See *Superguide*, 358 F.3d at 875; see also *Omega Eng’g*, 334 F.3d at 1324 (“As a basic principle of claim interpretation, prosecution disclaimer promotes the public notice function of the intrinsic evidence and protects the public’s reliance on *definitive* statements made during prosecution.”) (emphasis added).

Finally, the disputed term recites “signals,” not optical signals, which further weighs in favor of finding that the constituent term “signals” is not limited to optical signals. *See Phillips*, 415 F.3d at 1314 (“[T]he claim in this case refers to ‘steel baffles,’ which strongly implies that the term ‘baffles’ does not inherently mean objects made of steel.”)

The Court therefore hereby expressly rejects Defendants’ proposal that “operable to communicate one or more signals” means “transmitting one or more *optical* signals.” The parties’ dispute having thus been resolved, the disputed term need not be construed any further. *See U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) (“Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy.”); *see also O2 Micro*, 521 F.3d at 1362 (“[D]istrict courts are not (and should not be) required to construe every limitation present in a patent’s asserted claims.”); *Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1207 (Fed. Cir. 2010) (“Unlike *O2 Micro*, where the court failed to resolve the parties’ quarrel, the district court rejected Defendants’ construction.”).

The Court therefore construes “**operable to communicate one or more signals**” to have its **plain meaning**.

IV. CONCLUSION

The Court hereby orders the claim terms addressed herein construed as indicated. A chart summarizing these constructions is attached as Exhibit A.

The parties are further ordered that they may not refer, directly or indirectly, to each other’s claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual constructions

adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the constructions adopted by the Court.

SIGNED this 24th day of July, 2013.


CAROLINE M. CRAVEN
UNITED STATES MAGISTRATE JUDGE

Exhibit A

Agreed Claim Term	Court's Construction
“to receive at least a portion of at least one of the plurality of optical signal wavelengths” (‘605 patent, claim 1) “to receive at least a portion of [at least some of the] [a] first plurality of optical signal wavelengths” (‘347 patent, claims 1 & 13)	Plain meaning

Disputed Claim Term	Court's Construction
“optical switching element” (‘605 patent, claims 1, 7, 10, 11, 12, 17, 18 & 33)	“a device that selectively directs optical signal wavelengths from one path to another”
“an optical switching operation on [the] at least one [of the at least some] of the plurality of optical signal wavelengths” (‘605 patent, claims 1 & 24)	“selective directing of at least one of the plurality of optical signal wavelengths from one path to another”
“an optical switching operation on at least some of the [second] plurality of optical signal wavelengths” (‘347 patent, claims 1 & 13)	“selective directing of at least some of the optical signal wavelengths from one path to another”
“optical switching array” (‘605 patent, claims 20 & 24; ‘347 patent, claims 1 & 13)	“an array of devices that each selectively directs optical signal wavelengths from one path to another”
“signal” (‘605 patent, claims 1, 5, 8, 10, 11, 12, 14, 20, 23-25, 30 & 31; ‘347 patent, claims 1, 5 & 13)	“a representation of information conveyed”
“optical signal wavelength” (‘605 patent, claims 1, 5, 8, 10, 11, 12, 14, 20, 23-25, 30 & 31; ‘347 patent, claims 1, 5 & 13)	“light carrying information at a particular numerical wavelength”
“operable to communicate one or more signals” (‘605 patent, claims 11 & 20)	Plain meaning